

WHAT IS CLAIMED IS:

1 A portable apparatus for forming louvers in a seam of a section of structural steel decking

2 comprising:

3 a frame;

4 a first and second pivoted jaw member each pivotally attached to said frame, each of said

5 first and second pivoted jaw members comprising a free end and a driven end, said free end of

6 said first jaw member having a blade portion, said free end of said second jaw member having a

7 die portion, said free ends of said first and second jaw members being moveable between an

8 open position in which said blade portion of said first jaw member is displaced from said die

9 portion of said second jaw member to form a gap therebetween capable of receiving a seam

10 formed in the steel decking, and a closed position in which said blade portion of said first jaw

11 member passes at least partly through said die portion of said second jaw member, said blade

12 portion and said die portion having surfaces cooperating to shear a portion of the seam as said

13 blade portion passes through said die portion;

14 a pneumatic cylinder moveable between a first and a second position; and

15 a linkage connected at one end to said pneumatic cylinder and at the other end to said

16 first and second jaw members, said linkage moving said jaws to the open position in response to

17 said pneumatic cylinder moving to the first position and moving said jaws to the closed position

18 in response to said pneumatic cylinder moving to the second position; and

19 an air valve for admitting a flow of pressurized air into said pneumatic cylinder to urge

20 said pneumatic cylinder from said first position to said second position..

1 2. The apparatus of claim 1, wherein:
2 said blade portion of said first jaw member comprises a tip portion and a root portion,
3 said tip portion comprising a rounded region and said root portion comprising an undercut
4 region, said rounded region and said undercut region cooperating with said die portion of said
5 second jaw member to shear two opposing sides of a rectangular louver out of the seam of the
6 structural steel decking while leaving the remaining two opposing sides of the rectangular louver
7 attached.

1 3. The apparatus of claim 1, wherein said second jaw member comprises a pair of jaws,
2 each of said pair of jaws having a substantially identical planar cross section.

1 4. The apparatus of claim 3, wherein each of said pair of jaws has a planar cross section
2 that is a mirror image of the planar cross section of said first jaw member.

1 5. The apparatus of claim 1, wherein said linkage comprises:
2 a first and second link, said first and second links each having first ends, said first ends
3 being pivotally attached one to another to form a toggle input joint, said toggle input joint
4 attached to said pneumatic cylinder, said first link pivotally attached at a second end thereof to
5 said driven end of said first jaw member and said second link pivotally attached at a second end
6 thereof to said driven end of said second jaw member.

1 6. The apparatus of claim 5, further comprising;

2 a cross head operatively attached to said toggle input joint to constrain said toggle input joint to
3 move linearly, thereby causing said jaws members to move in unison.

1 7. The apparatus of claim 6, further comprising:
2 a connecting rod having an adjustable length operatively disposed between said
3 pneumatic cylinder and said toggle input joint.

1 8. The apparatus of claim 1, wherein:
2 said pneumatic cylinder comprises a housing comprising a wall having a substantially
3 circular interior cross section;

4 a flexible diaphragm disposed within said housing and sealed along an outer edge
5 thereof to said wall to divide said housing into a first and second chamber, said first chamber
6 having a fitting adapted to receive a source of high pressure air, said second chamber having an
7 opening for venting said second chamber to the atmosphere, said diaphragm being adapted to be
8 operatively attached to a connecting rod passing through said second chamber;

9 a spring disposed in said second chamber for urging said diaphragm toward said first
10 chamber.

1 9. The apparatus of claim 1, further including an exhaust valve operatively disposed
2 between said air valve and said pneumatic cylinder, said exhaust valve comprising:

3 a housing having an interior chamber, an inlet, an outlet, and an exhaust port, said
4 exhaust port including a valve seat;

5 valve member comprising a flexible disk disposed in said chamber moveable between a first
6 position in which said inlet is open and said exhaust port is sealed and a second position in
7 which said exhaust port is open and said inlet is sealed, said valve member adapted to move to
8 said first position in response to a flow of air through said inlet into said chamber and to move to
9 said second position in response to a flow of air through said outlet into said chamber.

1 10. A method of forming end-supported louvers in a seam of a portion of structural steel
2 decking comprising:

3 selecting a first and second piece of structural steel decking, said first piece of structural
4 steel decking having a female lip portion and said second piece of structural steel decking
5 having a male lip portion, said female lip portion and said male lip portion being adapted to form
6 a crimped seam;

7 placing said female lip portion over said male lip portion;

8 crimping said female lip portion over said male lip portion to form a seam;

9 selecting a louver forming apparatus comprising a frame pivotally supporting a first and
10 second pivoted jaw member, each of said first and second pivoted jaw members comprising a
11 free end and a driven end, said free end of said first jaw member having a blade portion, said
12 free end of said second jaw member having a die portion, said free ends of said first and second
13 jaw members being moveable between an open position in which said blade portion of said first
14 jaw member is displaced from said die portion of said second jaw member to form a gap
15 therebetween capable of receiving the seam, and a closed position in which said blade portion of
16 said first jaw member passes at least partly through said die portion of said second jaw member,

17 said blade portion and said die portion having surfaces cooperating to shear a portion of the
18 seam as said blade portion passes through said die portion;
19 moving the first and second jaw members of the louver forming apparatus into the open
20 position;
21 positioning the louver forming apparatus over the seam such that the seam is within the
22 gap formed between the first and second jaw members; and
23 forming a louver in said seam by moving the jaw members of the louver forming
24 apparatus to the closed position.

1 11. The method of claim 10, wherein

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2 The step of forming a louver comprises shearing opposing walls of a rectangular tab out
3 of the seam while leaving the remaining two walls of the tab intact; and
4 deforming the rectangular tab into a bowed louver supported at both ends, the louver
5 bridging a window formed in the seam by the step of shearing the rectangular tab.